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FEDERAL COMMUNICATIONS COMMISSION
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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Implementation of the	)	
Cable Television Consumer	)	MM Docket No.92-260
Protection and Competition	)	
Act of 1992	)	
	)	
Cable Home Wiring	)	

COMMENTS OF
BUILDING INDUSTRY CONSULTING
SERVICE INTERNATIONAL

Building Industry Consulting Service International ("BICSI") submits these comments in reponse to the Notice of Proposed Rule Making ("Notice") in the above-captioned proceeding, FCC 92-500, released November 6, 1992. The Notice was the first to be issued of many rule makings required to implement the Cable Television Consumer Protection and Competition Act of 1992 ("1992 Act"), P.L.No.102-385.

Specifically, Section 16(d) of the 1992 Act adds a subsection (i) at the end of Section 624 of the Cable Communications Policy Act of 1984, 47 U.S.C.§544:

> Within 120 days after the date of enactment[1] of this subsection, the Commission shall prescribe rules concerning the disposition, after a subscriber to a cable system terminates service, of any cable installed by the cable operator within the premises of such subscriber.

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[1] The enactment date was October 5, 1992, making the Commission's rule prescription deadline February 2, 1993.

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List A B C D E

Although the brief caption for this proceeding refers to "home" wiring, the statute encompasses the "premises" of any subscriber, whether a detached residence or office or a multi-unit, high-rise building. The Notice (¶3) acknowledges the scope of Section 16(d) of the 1992 Act.

BICSI's Interest

BICSI is a nearly 20-year-old non-profit professional association whose more than 2600 members are interested in the design and installation of telecommunications facilities in buildings. These members include manufacturers, architects, engineers, consultants, contractors, local exchange providers, interconnect companies, and suppliers. Members who meet BICSI's stringent competency requirements are granted the professional designation of Registered Communications Distribution Designer ("RCCD").

BICSI publishes and periodically updates a Telecommunications Distribution Methods Manual ("Methods Manual") which includes chapters on local area networks ("LANs"), fiber optic technology and other subjects associated with broadband distribution systems. Portions of the chapter on LANs discussing uses of coaxial cable, among other media, are found in Exhibit 1 to these comments.

BICSI previously has participated in the somewhat analogous Commission proceeding on connection of simple inside wiring to the telephone network, CC Docket 88-57. In letter comments of November 7, 1990 on petitions for reconsideration of a Report and Order in that docket, BICSI acknowledged owners' needs to maximize efficiency of intra-building distribution systems, but contended that the "end user must be considered as a critical party to any POD [point of demarcation] decision" -- meaning the precise location of the changeover from the telecommunications provider's network to the customer's facilities.

As technologies are developed, the uses of video delivery techniques will apply across all premises wiring, which will encompass more than the simple inside wire at issue in CC Docket 88-57. BICSI, as an organization of premises wiring designers and installers, expects to be deeply involved in the design and installation of these delivery systems. Rules adopted in this proceeding will affect BICSI members directly and substantially.

Cable home wiring rules should parallel those adopted for telephone inside wire.

The Commission should establish a uniform policy for all telecommunications wiring on the customer's premises, including both telephone and video delivery wiring. BICSI believes that it would be impractical and unworkable to establish separate policies for telephone and video delivery wiring. Increasingly, the transmissions of voice, data and video will become virtually identical and could share the same media.

In CC Docket 88-57 and related proceedings, the Commission adopted a provider/customer demarcation policy for telephone services.[2] BICSI believes that the Commission should fashion rules for cable home wiring that parallel those rules, to the extent permitted by the 1992 Act. The customer/owner should have control of cable home wiring in the same manner permitted for simple telephone wiring. To do otherwise would stifle competition if the incumbent

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[2] Section 68.3 of the Rules defines demarcation point as "the point of interconnection between the telephone company communications facilities and terminal equipment, protective apparatus or wiring at a subscriber's premises." This serves to bifurcate carrier and non-carrier responsibilities, the carrier being reponsible for the wiring on the network side of the interface, the owner having responsibility on the customer side. *Notice of Proposed Rule Making,* CC Docket 88-57, citing *First Report and Order,* CC Docket 81-216, 97 FCC 2d 527, 529 (1984).

video provider were to insist on removal of cable TV internal drop wire[3] following customer termination of the incumbent's service.

On reconsideration of its order detariffing customer inside telephone wire,the Commission prohibited carriers from using claims of ownership of inside wiring as a basis for restricting the customer's removal, replacement, rearrangement or maintenance of inside wiring that had ever been installed or maintained under tariff.[4] There the FCC said its goals were to increase competition in installation and maintenance services, to promote new entry to the inside wiring market and to save money for rate payers. Given the similarity of these purposes to the aims of the 1992 Act, the Commission would be well advised to look to the telephone inside wire regulatory model.

Working from the generality of the Congressional definition, the Commission should establish specific demarcation point regulations that identify the regulatory and technical characteristics of the customer premises interface for video services. This will enable a clearer understanding of demarcation by all interested parties.

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[3] The 1992 Act's legislative history appears to resolve at least partly the demarcation issue. As referenced in the Notice at ¶3, the House Report on the measure restricts its multi-unit building application to "only the wiring within the dwelling unit of individual subscribers." Thus, while cable drops typically are considered to originate at a trunk line on a pole or at some underground point exterior to a subscriber's dwelling, the portion of wire at issue here is strictly interior. *Cf. Tele-Vue Systems, Inc. v. Contra Costa County*, 25 Cal.App.3d 340, 101 Cal.Rptr. 789 (1972), discussed at n.25 of *Continental Cablevision of Michigan, Inc. v. City of Roseville*, 430 Mich.727, 425 N.W.2d 53 (1988).

[4] *Inside Wiring Reconsideration Order*, CC Docket 79-105, 1 FCC Rcd 1190, 1195-96 (1986), remanded *sub nom. NARUC v. FCC,* 880 F.2d 422 (D.C.Cir.1989), *Third Report and Order,* 7 FCC Rcd 1334 (1992).

The regulatory regime can and should be maintained independently of idiosyncratic state laws on ownership, valuation and taxation of property.

The Commission is correct to be concerned (Notice, ¶2) about how to balance Congress' apparent desire that cable subscribers be permitted to acquire video home wiring with the cable operator's "property, contractual, and access rights." The statement in the Senate Report is virtually unqualified; however, the House Report implies that customer ownership, *per se,* is less important than the subscriber's freedom to choose an alternative video provider and to avoid the disruption and possible damage of inside wire removal.

Moreover, the House Report (at 118-119) emphasizes that the 1992 Act's mandate on cable home wiring "does not address matters concerning the cable facilities inside the subscriber's home prior to termination of service.

> In this regard, the Committee does not intend that cable operators be treated as common carriers with respect to the internal cabling installed in subscribers' homes.

To this extent, the 1992 Act diverges from the Commission's telephone inside wire deregulatory scheme, where a subscriber's right to acquire does not depend on termination of service.

The Maryland and Michigan (n.3, *supra*) tax cases cited in the Notice (¶5), and the cases from Ohio, California and elsewhere referenced in those decisions, suggest how varied are state approaches to treatment of ownership, valuation and taxation of utility and cable TV drop wires. However, at least two themes are common to the Maryland and Michigan cases: (1) the cable operator's economic incentives run to keeping the drops in place,[5] and they are almost never removed; (2) the FCC's requirement that the cable operator maintain control of cables against, for example, the hazard of signal leakage is not dispositive of the property and tax questions decided there.

Reading the 1984 Cable Communications Policy Act together with the 1992 Act and with the evidence of current practice contained in the cited state cases, it would appear that:

• The Commission could declare here a customer purchase option for cable home wiring -- exercisable at termination of service -- but might wish to defer the consideration of prices, terms and conditions to rate proceedings that will be conducted later in further implementation of the 1992 Act.

• Signal leakage and other operator responsibilities can still be imposed on successor video providers, even if the home wire is owned by the subscriber.[6]

• While customer ownership of interior cable wire may inevitably produce tax consequences, the Commission wherever possible should avoid resting its regulations on non-uniform state tax and property laws and practices.[7]

• Because Congress appears to have restricted the mandate of new Section 624(i) to intra-dwelling unit cable, the Commission is not required by the

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[5] In the Michigan case, evidence was presented of installation charges to subscribers covering less than half the labor and materials involved. It was said that house drops have no "known salvage value." 425 N.W.2d at 55.

[6] Obviously, for as long as service remains terminated, the "empty" wire owned by the customer poses no radio interference threat. BICSI members deal routinely with the risk of faulty installation of home cable wiring. They are well equipped to provide designs that will minimize if not eliminate the potential difficulty. *See, e.g.*, the Methods Manual excerpts at Exhibit 1.

[7] Historically, for example, depreciation for regulatory purposes may differ and has differed from depreciation for tax purposes.

1992 Act to establish policy on cable operators' rights of access to buildings which may contain multiple dwelling units.

Conclusion

For the reasons stated above, BICSI urges the Commission to adopt cable home wiring rules which, so far as legally possible, parallel the pro-competitive regulations governing telephone inside wire and place maximum discretion in the end user. BICSI believes these rules can be adopted with due regard for, but without dependence on, non-uniform state property and tax laws.

Respectfully submitted,

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Contents, continued

SUBJECT	CHAPTER/PAGE

(continued)

BASEBAND SYSTEMS, continued

Advantages of Baseband Systems, continued

This is one of the advantages of baseband systems over broadband systems.

The couplers used to connect a device to a baseband bus send signals in both directions. Since regenerators also work in both directions, only a single cable is required for a baseband system.

BROADBAND SYSTEMS

Description

Broadband LANs modulate the signal and use FDM to create independent channels, which can be multiplexed further by TDM.

Amplifiers

Amplifiers are placed in broadband LANs to increase signal strength and restore signal loss caused by:

- Signaling splitters.
- Directional couplers.
- The cable.

Inserting high quality amplifiers in the correct locations allows a cable network to extend over 100 miles. However, most networks extend less than 10 miles.

Single-Cable or Double-Cable Systems

Broadband systems provide two-way communications as either single-cable or double-cable systems. On single-cable broadband systems, bidirectional amplifiers amplify:

- Forward band signals in the outbound direction.
- Reverse band signals in the inbound direction (to the head end of the system).

Frequency Translators

Most broadband LANs use a frequency translator at the head end of the system to convert received reverse-band signals to forward-band signals and retransmission in the outbound direction. A device can communicate with any other device in the system by transmitting reverse-band signals and receiving forward-band signals.

Modems

A modem (modulator-demodulator) must be placed between a device and the tap connecting it to the system for the device to transmit or receive digital data on a single-cable or dual-cable system. The modem converts:

- A transmitted digital signal to an analog signal which uses the frequencies of the cable channel it has been assigned.
- Analog signals from a particular channel on the cable to digital signals.

(continued)

BROADBAND SYSTEMS, continued

Modems, continued

Devices exchanging data over a single-cable system must have modems that can send signals in the reverse band and receive signals in the forward band. In a dual-cable system, modems listen to the same frequencies that are used for transmitting, but are physically connected to two different cables.

Applications

Broadband systems are used primarily for data communication. However, they are also used to provide independent communication for voice, video, and other applications.

TRANSMISSION MEDIA

Introduction

The three most common types of transmission media in the LAN marketplace are:

- Twisted-pair wire.
- Coaxial cable.
- Optical fibers.

Twisted-Pair Wire

In twisted-pair wire, a pair of wires (usually copper) are twisted together to minimize the interference from nearby pairs in a multipair cable. However, twisted-pair wire still absorbs and emits a large amount of electrical interference even when the wires are shielded to minimize interference.

This has a potential for causing high bit error rates and security problems. For this reason, twisted pair is not used as frequently as coaxial cable.

Twisted-pair wire supports data transmission rates of up to 10 Mb/s.

Coaxial Cable

Coaxial cable provides a much higher degree of protection against electrical interference than twisted-pair wire.

Coaxial cables consist of an inner conductor insulated from an outer conductor and an optional outer jacket.

The inner conductor:

- Carries the transmitted signal.
- Can be either a solid conductor or stranded wire.

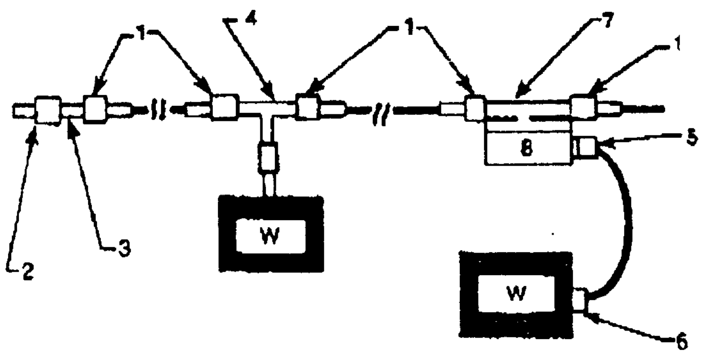
(continued)

IEEE 802.3 10BASE2, continued

10Base2 Schematic

The schematic for the 10Base2 network shown in "10Base2 Configuration" is shown in the illustration below.

NOTE: The components in this diagram are described in the chart in "10Base2/Network Components" below. The numbers on this diagram correspond to the parenthetical numbers in that chart.



10Base2 Network Components

The specifications for a 10Base2 network's components are listed in the chart below.

COMPONENT	DESCRIPTION/SPECIFICATIONS
Main Cable Connectors	BNC series: • BNC connector (1). • Terminators (2). • Jack-to-jack splice (3). • T-connector (4).
Drop Cable Connectors	D Subminiature, 15-Position (5)(6) for 4-pair -20 AWG.
Taps/Transceivers	IEEE 802.3 specifies a maximum of 30 taps for each 185-meter cable segment. The distance between taps must be at least one-half meter (1.64 feet). Transceivers are used to transmit and receive signals along the bus. When twisted pair transceiver cable is used to attach a station to the bus, the transceiver (8) is located along the main cable and attached to the tap via a printed circuit board connector. When the station is attached directly to the coaxial cable using a T-connector (7), the transceiver is a part of the Ethernet board in the workstation.

(continued)

IEEE 802.3 10BASE2, continued

10Base2 Network Components, continued

COMPONENT	DESCRIPTION/SPECIFICATIONS
Main Cable	50-ohm RG-58 thin coaxial cable; 185 meters or 607 feet per cable segment without repeaters; 950 meter end-to-end limit.
Drop Cable	Four shielded, twisted pairs; one each for transmit, receive, collision detection, and power for the transceiver; optional pair for control signals; length to 50 meters.
Repeaters	Used at the end of main cable segments to regenerate and retransmit signals onto the next backbone cable segment.

Variations of IEEE 802.3

The Technical and Office Protocols (TOP) specification includes all variations of IEEE 802.3.

Ancillary Equipment

Generally, the commercially available local area network products which conform to the IEEE 802.3 standard for thick coaxial can also be implemented using thin coaxial.

Incompatible workstations may be connected to the network via an NID which converts the signal from the workstation's native protocol to the IEEE 802.3 protocol. The NID may be a separate unit or a board which is inserted in a PC. Some units and boards have both D Subminiature and BNC connectors.

IEEE 802.4 BROADBAND/MAP

General Description

In 1980, General Motors began to define a set of network standards which would allow them to more easily interconnect factory equipment. The cabling and low-level protocols of the standard became the basis for IEEE 802.4, which addresses factory needs by specifying more noise immunity and more precise windows for message delivery. The Manufacturing Automation Protocol (MAP) specification uses IEEE 802.4 for its lower levels as well.

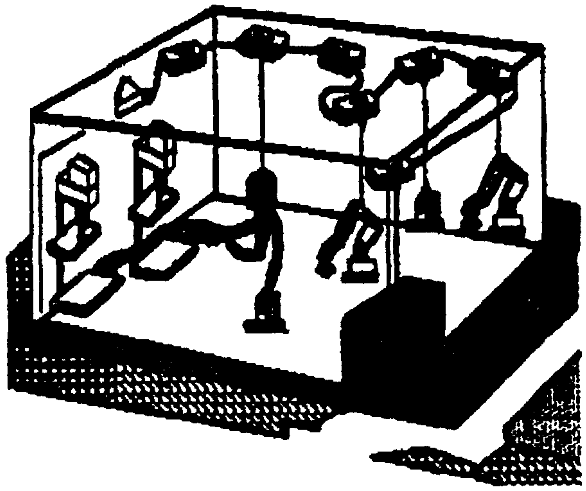
The characteristics of a Broadband/MAP network are:

- 10 Mb/s data rate.
- Bus topology.
- Broadband, analog transmission.
- Token passing access protocol.

IEEE 802.4 BROADBAND/MAP, continued

Broadband/MAP Configuration

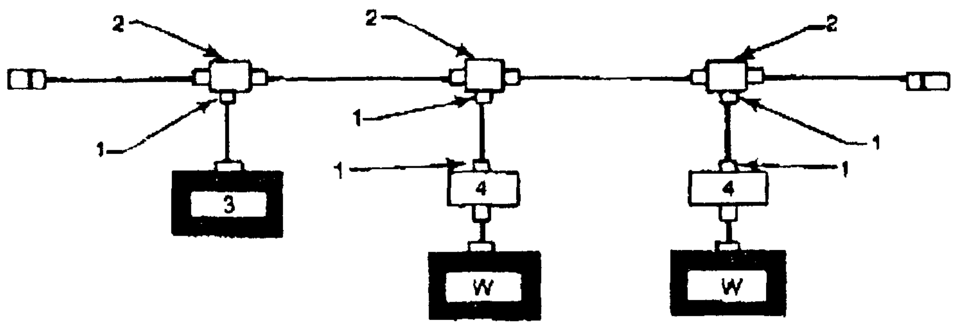
The configuration for a Broadband/MAP network is shown in the illustration below.



Broadband/MAP Schematic

The schematic for the Broadband/MAP network in "Broadband/MAP Configuration" is shown in the illustration below.

NOTE: The components in this diagram are described in the chart in "Broadband/MAP Network Components" on Page 34. The numbers on this diagram correspond to the parenthetical numbers in that chart.



W = Workstation
1 = Drop Cable Connector
2 = Tap
3 = Head-End Remodulator
4 = Network Interface Device

IEEE 802.4 BROADBAND/MAP, continued

Broadband/MAP Network Components

The specifications for a Broadband/MAP network's components are given in the chart below.

MAP COMPONENT	DESCRIPTION/SPECIFICATIONS
Main Cable Connectors	Not specified in the standard; typically, CATV-type.
Drop Cable Connectors	F-series connectors (1).
Taps	Standard CATV directional taps (2), usually with four ports, are used to attach drop cables to the network. Trunk cable splitters are also used for branching.
Head End Remodulator	The head end remodulator (3) receives, amplifies, filters, remodulates, and broadcasts all transmissions on the network. Messages sent from a station go to the head end on one frequency and are broadcast to the network on another frequency (i.e., remodulated). The head end is connected to the network by drop cables, the same as any other station.
Network Interface Device	Interface (4) to the IEEE 802.4 network requires a modem and a protocol converter (usually). These devices may be separate units or internal to the attached workstation. Modems are generally separate. Protocol converters are separate or combined with modems and will continue to be separate units until vendors begin to use the IEEE 802 standards as their native protocols. Modems are used to convert digital signals from workstations to analog signals, and to transmit them to the head end; on the reverse path, they receive and convert to digital.
Main Cable	75-ohm, rigid or semi-rigid coaxial cable, usually with a rigid aluminum shield of seamless tubing. With dual cables a head end remodulator is not needed. The distance covered by an IEEE 802.4 network is not dictated by the standard; it is a function of the signal loss, amplification, and required response time. "Standard CATV cable" is specified; no RG number is indicated.
Drop Cable	75-ohm, flexible coaxial cable; typically, 10 to 50 feet long; RG-59, -11, or -6.

(continued)

Broadband/MAP Network Components, continued

MAP COMPONENT	DESCRIPTION/SPECIFICATIONS
Amplifiers	Standard bidirectional CATV amplifiers are used to ensure that signal levels required by attached devices are maintained. IEEE 802.4 specifies a maximum of 25 amplifiers between any two devices on the same path.

Variations and Alternatives to Broadband/MAP

The 802.4 broadband standard is the best known of the original 802.4 standards. Two baseband analog versions were also specified in the original standard. A fiber optic alternative is in the approval stages.

IEEE 802.4 Baseband at 1 Mb/s uses the same trunk cable but connects stations on short stub drops via:

- Trunk T-connectors.
- Less than 350 mm 50-ohm drops.
- 50-ohm BNC connectors.

Modems are still required, but head end remodulators are not. Repeaters replace amplifiers.

IEEE 802.4 Baseband at 5 or 10 Mb/s is the same as IEEE 802.4 Baseband at 1 Mb/s except that taps and drop cables are the same as the broadband standard. This alternative provides an easier migration path to a broadband network. Also called "carrierband," the alternative is gaining popularity as a cell-level subnetwork and as a less expensive, easy-to-migrate alternative to broadband. Due to the different modulation technique (carrierband), the electronics required for transmitting and tuning are simpler and less expensive.

MAP Protocol Specifications

MAP is a protocol specification which was originally developed in 1980 by General Motors to allow them to interconnect factory devices from different vendors. A number of different protocols, serving different network needs, are specified. At the lowest level, the MAP specification calls out IEEE 802.4. (MAP actually preceded 802.4, and was the basis for the IEEE standard developed in 1984.) The higher protocol levels specified by MAP were selected from other internationally recognized standards, and are fully compatible with the ISO open systems architecture. MAP recognizes 802.4 Broadband, Carrierband, and Fiber (now in the proposal stage). A MAP Users' Group, originally founded by General Motors and McDonnell Douglas, is combined with the TOP Users' Group and has 1,500 member companies worldwide.

IEEE 802.5/IBM TOKEN RING

General Description

IEEE 802.5 is based on the two lower layers of IBM's token ring LAN, which was brought to the marketplace in 1985. It is expected to be the first IBM LAN capable of fully interfacing with SNA. The characteristics of token ring networks include:

- 4 Mb/s.
- 260 stations maximum.
- Ring topology, star-wired.
- Digital transmission.
- Token passing access protocol.

Token Ring Configuration

The configuration for a token ring network is shown in the illustration below.